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Diffusion of Sodium in Sodium Boroaluminosilicate Glasses: Impact of Mixed Network Formers and the Influence of Water

Xinwei Wu¹, Qiuju Zheng², John Mauro³, Marcel Potuzak³, Adam Ellison³, and Rüdiger Dieckmann¹

¹*Department of Materials Science and Engineering, Cornell university, Ithaca, New York, USA*

²*Section of Chemistry, Aalborg University, DK-9000 Aalborg, Denmark*

³*Science and Technology Division, Corning Incorporated, Corning, New York, USA*

To investigate how the diffusion of sodium in selected sodium boroaluminosilicate glasses is influenced by variations in the network former composition, sodium tracer diffusion measurements using the radioactive isotope sodium-22 have been performed.

Two series of glasses were considered,

$[(\text{Na}_2\text{O})_{0.71}(\text{Fe}_2\text{O}_3)_{0.05}(\text{B}_2\text{O}_3)_{0.24}]_{0.2}[(\text{SiO}_2)_x(\text{Al}_2\text{O}_3)_{1-x}]_{0.8}$ and

$[(\text{Na}_2\text{O})_{0.73}(\text{B}_2\text{O}_3)_{0.24}(\text{As}_2\text{O}_3)_{0.03}]_{0.18}[(\text{SiO}_2)_x(\text{Al}_2\text{O}_3)_{1-x}]_{0.82}$ with the composition parameter x varying between 0 to 1. Sodium tracer diffusion experiments were performed by diffusion annealing in dry and wet air at atmospheric pressure at different temperatures between 200 and 300 °C. The experimental results obtained will be presented and discussed.